

Listing of the Claims

1. (Currently Amended) A radio frequency coil ~~(44, 44', 44'', 144, 154)~~ comprising:

a substrate ~~(72)~~;

a radio frequency antenna ~~(90)~~ disposed on the substrate ~~(72)~~; and

an electronics module ~~(78, 78')~~ disposed on the substrate ~~(72)~~ and electrically connected with the radio frequency antenna ~~(90)~~.

2. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1, wherein:

the electronics module ~~(78, 78')~~ is disposed on a central region ~~(96)~~ of the substrate ~~(72)~~; and

the radio frequency antenna ~~(90)~~ includes a conductor disposed on the substrate ~~(72)~~ outside of and at least partially surrounding the central region ~~(96)~~ of the substrate ~~(72)~~.

3. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 2, wherein the conductor of the radio frequency antenna ~~(90)~~ comprises:

a conductive film disposed on the substrate ~~(72)~~ defining at least one conductive loop ~~(90)~~ substantially surrounding the central region of the substrate ~~(72)~~, ends ~~(100)~~ of said at least one conductive loop ~~(90)~~ extending into the central region ~~(96)~~ of the substrate ~~(72)~~ and connecting with the electronics module ~~(78, 78')~~.

4. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 3, wherein the substrate ~~(72)~~ comprises:

a flexible electrically insulating material.

5. (Currently Amended) The radio frequency coil ~~(44', 144, 154)~~ as set forth in claim 3, wherein the electronic module ~~(78')~~ comprises:

printed circuitry ~~(110)~~ disposed on the substrate ~~(72)~~; and

one or more discrete circuit components ~~(112, 114, 116)~~ electrically connected via the printed circuitry ~~(110)~~.

6. (Currently Amended) The radio frequency coil (44", 144, 154) as set forth in claim 2, further comprising:

at least one spacer element (130) disposed between the substrate (72) and the electronics module (78), the at least one spacer element (130) defining a spacing (D_{spe}) between the electronics module (78) and the radio frequency antenna (90).

7. (Currently Amended) The radio frequency coil (44", 144, 154) as set forth in claim 6, wherein the spacing (D_{spe}) is at least about one-fifth of a lateral dimension (W_{ant}) of radio frequency antenna (90).

8. (Currently Amended) The radio frequency coil (44, 44', 44", 144, 154) as set forth in claim 2, wherein the electronics module (78, 78') has a lateral dimension (W_{elec}) that is less than or about three-fifths of a lateral dimension (W_{ant}) of the radio frequency antenna (90).

9. (Currently Amended) The radio frequency coil (44, 44', 44", 144, 154) as set forth in claim 1, wherein the electronic module (78, 78') comprises:

a wireless transmitter (116, 126) transmitting a transmission signal representative of a radio frequency signal received by the radio frequency antenna (90).

10. (Currently Amended) The radio frequency coil (44, 44', 44", 144, 154) as set forth in claim 1, wherein the electronic module (78, 78') comprises:

a one or more noisy circuit components (114) generating substantial radio frequency interference;

one or more quiet circuit components (112, 116) not generating substantial radio frequency interference; and

a radio frequency shield (120) disposed around the one or more noisy circuit components (114) but not around the one or more quiet circuit components (112, 116).

11. (Currently Amended) The radio frequency coil (44, 44', 44'', 144, 154) as set forth in claim 10, wherein:

the radio frequency antenna (90) defines a loop surrounding a central region (96) of the substrate (72); and

the radio frequency shield (120) is disposed substantially centered in the central region (96) of the substrate (72).

12. (Currently Amended) The radio frequency coil (44, 44', 44'', 144, 154) as set forth in claim 1, wherein the electronic module (78, 78') does not include a ground plane.

13. (Currently Amended) The radio frequency coil (44, 44', 44'', 144, 154) as set forth in claim 1, wherein inductors (112) of the electronic module (78, 78') are selected from a group consisting of:

toroidal inductors (112), and

solenoidal inductors with balanced turns.

14. (Currently Amended) A radio frequency coils array (40, 140, 150) comprising:

a plurality of radio frequency coils (44, 44', 44'', 144, 154) as set forth in claim 2 arranged such that the radio frequency antennae (90) of the plurality of radio frequency coils (44, 44', 44'', 144, 154) span a coil array surface.

15. (Currently Amended) The radio frequency coils array (40) as set forth in claim 14, wherein the substrates (72) of at least some of the plurality of radio frequency coils (44, 44', 44'') are tilted with respect to the substrates (72) of other coils of the plurality of radio frequency coils (44, 44', 44'') such that the coil array surface is non-planar.

16. (Currently Amended) The radio frequency coils array ~~(40, 150)~~ as set forth in claim 14, wherein at least one coil of the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~ is entirely surrounded by other coils of the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~.

17. (Currently Amended) The radio frequency coils array ~~(40, 150)~~ as set forth in claim 14, wherein the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~ are arranged in an $N \times M$ array where $N > 2$ and $M > 2$.

18. (Currently Amended) The radio frequency coils array ~~(40, 150)~~ as set forth in claim 14, wherein at least some of the coils of the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~ share a common substrate.

19. (Currently Amended) A magnetic resonance imaging system comprising:
a main magnet ~~(20)~~ producing a substantially temporally constant main magnetic field within a field of view;
magnetic field gradient coils ~~(30)~~ that impose selected magnetic field gradients on the main magnetic field within the field of view;
a means ~~(32, 54)~~ for applying a radio frequency pulse to the field of view; and
at least one radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1 arranged to detect a magnetic resonance signal induced by the applied radio frequency pulse.

20. (Currently Amended) A magnetic resonance imaging method comprising:
exciting magnetic resonance in an imaging subject ~~(16)~~; and
receiving a magnetic resonance signal using one or more radio frequency coils ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1 with the radio frequency antenna ~~(90)~~ of each coil in proximity to the imaging subject ~~(16)~~.